

WHAT IS CLAIMED IS:

- 1 1. An audio system for use with a personal computer, the audio system
2 comprising:
 - 3 a first voltage supply;
 - 4 a second voltage supply;
 - 5 an audio amplifier;
 - 6 means for connecting a first speaker to the audio amplifier;
 - 7 a jack for coupling a second speaker to the audio amplifier;
 - 8 a jack-sense line coupled to the jack, the jack-sense line assuming a first
9 condition when a speaker is connected to the jack and assuming a
10 second condition when a speaker is not connected to the jack; and
11 a switch coupled to the first voltage supply, to the second voltage supply, and
12 to the audio amplifier, wherein the switch operates in response to the
13 first condition of the jack-sense line to couple the first voltage supply
14 to the audio amplifier and operates in response to the second condition
15 of the jack-sense line to couple the second voltage supply to the audio
16 amplifier.
- 1 2. An audio system as defined in Claim 1, wherein the switch is coupled
2 to an output of the audio amplifier and operates to enable single-ended operation of
3 the audio amplifier in response to the first condition and to enable bridged mode
4 operation in response to the second condition.
- 1 3. An audio system as defined in Claim 2, wherein the switch is coupled
2 between an output of the audio amplifier and the first speaker.
- 1 4. An audio system as defined in Claim 2, wherein the switch has a first
2 pole coupled to a voltage supply node of the audio amplifier, a first contact coupled to
3 the first voltage supply, and a second contact coupled to the second voltage supply.
- 1 5. An audio system as defined in Claim 4, wherein the switch has a
2 second pole coupled to an output of the audio amplifier and a third contact coupled to
3 the first speaker.

1 6. An audio system as defined in Claim 1, wherein the audio amplifier
2 includes a noninverting stage and an inverting stage and wherein the first speaker is
3 coupled across an output of the noninverting stage and an output of the noninverting
4 stage.

1 7. An audio system as defined in Claim 6, wherein the switch is coupled
2 to an output of the audio amplifier and to the first speaker and operates to enable
3 single-ended operation of the audio amplifier in response to the first condition and to
4 enable bridged mode operation in response to the second condition.

1 8. An audio system as defined in Claim 7, wherein the switch is coupled
2 between an output of the audio amplifier and the first speaker.

1 9. An audio system as defined in Claim 8, wherein the switch has a first
2 pole coupled to a voltage supply terminal of the audio amplifier a first contact coupled
3 to the first voltage supply, and a second contact coupled to the second voltage supply.

1 10. An audio system as defined in Claim 9, wherein the first voltage supply
2 is a low-current, regulated supply.

1 11. An audio system as defined in Claim 9, wherein the second voltage
2 supply is a high-current supply.

1 12. A personal computer system comprising an audio system, the audio
2 system comprising:

3 a voltage supply subsystem having a first output and a second output;
4 an amplifier subsystem having a first stage with a noninverting output and a
5 second stage with an inverting output;
6 a first speaker coupled between the inverting output and the noninverting
7 output;
8 a jack coupled to an amplifier output for a second speaker;
9 a mode switch coupled to the voltage supply subsystem and to the power
10 amplifier subsystem;

11 a jack-sense line coupled between the jack and the mode switch to cause the
12 audio system to operate in a single-ended mode when the second
13 speaker is coupled to the jack and in a bridged mode when the second
14 speaker is not coupled to the jack.

1 13. A personal computer system as defined in Claim 12, wherein the
2 voltage supply subsystem comprises a first voltage supply coupled to the first output
3 of the voltage supply subsystem and a second voltage supply coupled to the second
4 output of the voltage supply subsystem.

1 14. A personal computer system as defined in Claim 13, wherein the mode
2 switch is coupled between the voltage supply subsystem and a voltage supply node of
3 the amplifier subsystem so that the first voltage supply is coupled to the voltage
4 supply node in the single-ended mode and the second voltage supply is coupled to the
5 voltage supply node in the bridged mode.

1 15. A personal computer system as defined in Claim 14, wherein the first
2 voltage supply is a low-current supply and the second voltage supply is a high-current
3 supply.

1 16. An apparatus comprising:
2 a personal computer chassis having a connector for a primary system speakers
3 and a jack for a secondary speakers system,
4 an audio amplifier system including an audio amplifier enclosed within the
5 computer chassis;
6 a jack-sense indicator coupled between the jack and the audio amplifier
7 system, wherein the jack-sense indicator is operable to provide a first
8 indication when the secondary speaker system connected to the jack
9 and a second indication when the secondary speaker system is not
10 connected in the jack;
11 a dual-mode voltage supply comprising a first voltage source and a second
12 voltage source; and
13 a switch coupled to the dual-mode voltage supply and to the jack-sense
14 indicator for coupling the first voltage source to the audio amplifier

15 when the secondary speaker system is connected to the jack and for
16 coupling the second voltage source to the audio amplifier when the
17 secondary speaker system is not connected to the jack.

1 17. An apparatus as defined in Claim 16, wherein the audio amplifier
2 includes an inverting stage having an inverting output and a noninverting stage having
3 a noninverting output and wherein the connector is coupled between the inverting
4 output and the noninverting output and the jack is connected between (i) either the
5 inverting output or the noninverting output and (ii) GND.

1 18. An apparatus as defined in Claim 17, Wherein the audio amplifier
2 includes a voltage supply node and wherein the switch is coupled to the first voltage
3 source, to the second voltage source and to the voltage supply terminal and wherein
4 the switch operates to selectively couple either the first voltage source or the second
5 voltage source to the voltage supply terminal in response to a signal provided by the
6 jack-sense indicator.

1 19. An apparatus as defined in Claim 18, wherein the first voltage source is
2 a low-current voltage source and the second voltage source is a high-current voltage
3 source.

1 20. An apparatus as defined in Claim 19, wherein first voltage source is a
2 regulated voltage source and the second voltage source is an unregulated voltage
3 source.

1 21. An apparatus as defined in Claim 20, wherein the first voltage source is
2 derived from the second voltage source.

1 22. In a personal computer, a method of supplying power to an audio
2 amplifier, the method comprising:
3 providing a voltage supply system that includes a first voltage source and a
4 second voltage source;
5 detecting whether an ancillary audio apparatus is connected to the personal
6 computer; and

7 coupling the first voltage source to the audio amplifier when the ancillary
8 audio apparatus is connected to the personal computer and coupling the
9 second voltage source to the audio amplifier when the ancillary audio
10 apparatus is not connected to the personal computer.

1 23. A method as defined in Claim 22, wherein detecting is effected through
2 the operation of a jack-sense indicator.

1 24. A method as defined in Claim 23, wherein coupling is effected through
2 the operation of a switch that is coupled to the jack-sense indicator, to the voltage
3 supply system and to a voltage supply node of the audio amplifier.

1 25. A method as defined in Claim 24, further comprising causing the first
2 voltage supply terminal when the audio amplifier operates in a single-ended mode and
3 causing the second voltage source to be coupled to the voltage supply terminal when the
4 audio amplifier operates in a bridged mode.

1 26. A method as defined in Claim 25, wherein the first voltage source is a low-
2 current source and the second voltage source is a high-current source.

1 27. A method as defined in Claim 26, wherein the first voltage source is a
2 regulated voltage source.

1 28. A computer system comprising a dual-mode audio amplifier arrangement
2 that selectively operates in either a single-ended mode or in a bridged mode, the audio
3 amplifier arrangement comprising:

4 an audio amplifier having a first output terminal, a second output terminal and a
5 voltage supply node, wherein in the single-ended mode an audio output
6 signal appears between the first output terminal and GND and wherein in
7 the bridged mode an audio output signal appears between the first output
8 terminal and the second output terminal;

9 a first voltage supply;
10 a second voltage supply; and

11 mode-selecting means for selectively coupling the first voltage supply to the
12 voltage supply node in the single-ended mode and coupling the second
13 voltage supply to the voltage supply terminal in the bridged mode.

1 29. A computer system as defined in Claim 28, wherein the mode-selecting
2 means comprises:

3 a jack-sense indicator coupled to the first terminal; and
4 a switch coupled to the jack-sense indicator, to the first and second voltage
5 supplies, and to the voltage supply node, the switch operable in response to
6 signals provided by the jack sense indicator to couple the first voltage
7 supply to the voltage supply node in the single-ended mode and to couple
8 the second voltage supply to the voltage supply node in the bridged mode.

1 30. A computer system as defined in Claim 28, wherein the audio amplifier
2 comprises:

3 a noninverting stage having a noninverting output; and
4 an inverting stage having an inverting output.

1 31. A computer system as defined in Claim 30, wherein the mode-selecting
2 means comprises:

3 a jack-sense indicator coupled to the first terminal; and
4 a switch coupled to the jack-sense indicator, to the first and second voltage
5 supplies, and to the voltage supply node, the switch operable in response to
6 signals provided by the jack-sense indicator to couple the first voltage
7 supply to the voltage supply node in the single-ended mode and to couple
8 the second voltage supply to the voltage supply node in the bridged mode.

1 32. A computer system as defined in Claim 31, wherein the switch comprises a
2 pole coupled to the inverting output and a first terminal coupled to the second output
3 terminal and wherein the switch is operable to couple the noninverting output to the
4 second output terminal in the bridged mode.

1 33. In a personal computer system, an audio amplifier system comprising:
2 a first amplifier stage having an input, an output, and a voltage supply connection;

3 a second amplifier stage having an input, an output and a voltage supply
4 connection;
5 a first speaker connection;
6 a second speaker connection;
7 a jack coupled to the first speaker connection;
8 a jack-sense indicator;
9 a voltage supply node;
10 a first voltage supply coupled to the voltage supply node and adapted to be
11 coupled to the AC line;
12 a second voltage supply coupled to the voltage supply node;
13 a first switch element coupled to the jack-sense indicator and having a pole
14 coupled to the output of the second amplifier stage and having a contact
15 coupled to the second speaker connection; and
16 a second switch element having a pole connected to the voltage supply connection
17 of the first amplifier stage, a first contact coupled to the voltage supply
18 node, and a second contact coupled to the second voltage supply, whereby
19 the jack-sense indicator is coupled to the first switch element and to the
20 second switch element and is operable to determine the respective
21 conditions of the switch elements in response to a determination whether
22 external speakers are connected to the jack.

1 34. An audio amplifier system in a personal computer is defined in Claim 33,
2 wherein the jack-sense indicator detects the absence of external speakers connected in the
3 jack and wherein:
4 (i) the pole of first switch element is connected to the contact of the first switch
5 element so that the output of the second amplifier stage is coupled to the
6 second speaker connection; and
7 (ii) the pole of the second switch element connected to the first contact of the
8 second switch element so that the first voltage supply is coupled to the
9 voltage supply connection of the first amplifier stage and the second
10 voltage supply is disconnected from the voltage supply connection of the
11 first amplifier stage.

1 35. An audio amplifier system in a personal computer as defined in Claim 33,
2 wherein the jack-sense indicator detects the presence of external speakers connected in the
3 jack and wherein:

4 (i) the pole of the first switch element is disconnected from the contact of the first
5 switch element so that the output of the second amplifier stage is not
6 coupled to the second speaker connection; and
7 (ii) the pole of the second switch element is connected to the second contact of the
8 second switch element so that the first voltage supply is not coupled to the
9 voltage supply connection of the first amplifier stage and the second
10 voltage supply is connected to the voltage supply connection of the first
11 amplifier stage.

1 36. An audio amplifier system in a personal computer system as defined in
2 Claim 33, wherein the first voltage supply is arranged to provide high voltage and/or
3 current to the first amplifier stage and to the second amplifier stage so as to promote
4 bridged-mode operation of the audio amplifier system and the second voltage supply is
5 arranged to provide noise-immune performance to the first amplifier stage so as to
6 promote single-ended operation of the audio amplifier system.

1 37. An audio amplifier system in a personal computer is defined in Claim 36,
2 wherein the jack-sense indicator provides a signal at its output that indicates the absence
3 of external speakers connected in the jack and wherein:

4 (i) the pole of the first switch element is connected to the contact of the first
5 switch element so that the output of the second amplifier stage is coupled
6 to the second speaker connection; and
7 (ii) the pole of the second switch element connected to the first contact of the
8 second switch element so that the first voltage supply is coupled to the
9 voltage supply connection of the first amplifier stage and the second
10 voltage supply is disconnected from the voltage supply connection of the
11 first amplifier stage.

1 38. An audio amplifier system in a personal computer as defined in Claim 36,
2 wherein the jack sense indicator provides a signal at its output that indicates the presence
3 of external speakers connected in the jack and wherein:

4 (i) the pole of the first switch element is disconnected from the contact of the first
5 switch element so that the output of the second amplifier stage is not
6 coupled to the second speaker connection; and
7 (ii) the pole of the second switch element is connected to the second contact of the
8 second switch element so that the first voltage supply is not coupled to the
9 voltage supply connection of the first amplifier stage and the second
10 voltage supply is connected to the voltage supply connection of the first
11 amplifier stage.

1 39. A method of receiving an audio signal from a personal computer, the
2 method comprising:

3 (a) connecting an ancillary audio apparatus into a user-accessible first audio
4 connection;
5 (b) as a result of step (a), causing a jack-sense indicator to provide a signal that
6 indicates that an ancillary audio apparatus is connected in the user-
7 accessible first audio connection;
8 (c) as a result of step (b), causing an audio amplifier to be disconnected from a
9 second audio connection; and
10 (d) as a result of step (b) causing a first voltage supply to be disconnected from the
11 audio amplifier and a second voltage supply to be connected to the audio
12 amplifier.